Development Across the Lifespan

Chapter 7

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Chapter 7 Learning Objective Menu

- LO 7.1 Special research methods used to study development
- LO 7.2 Relationship between heredity and environmental factors
- LO 7.3 Chromosomes, genes and DNA
- LO 7.4 How twins develop during pregnancy
- LO 7.5 How conjoined twins adjust to being connected
- LO 7.6 Germinal, embryonic, and fetal periods of pregnancy
- LO 7.7 Physical changes in infancy and childhood
- LO 7.8 Facts and myths concerning infant immunizations
- LO 7.9 Three ways of looking at cognitive development
- LO 7.10 How language develops
- LO 7.11 How infants and children develop personalities and form relationships
- LO 7.12 Erikson's first four stages of psychosocial development
- LO 7.13 Changes in puberty
- LO 7.14 How adolescents develop formal operation and moral thinking
- LO 7.15 Adolescent's search for identity
- LO 7.16 Physical and cognitive changes during adulthood and aging
- LO 7.17 Work, relationships, parenting, aging, and death
- LO 7.18 Theories of why aging occurs
- LO 7.19 Stages of death and dying
- LO 7.20 How attention-deficit/hyperactivity disorder affects adults

Developmental Research Designs

- Human development - the scientific study of the changes that occur in people as they age from conception until death.
- Longitudinal design - research design in which one participant or group of participants is studied over a long period of time.
- Cross-sectional design - research design in which several different age groups of participants are studied at one particular point in time.
- Cross-sequential design - research design in which participants are first studied by means of a crosssectional design but also followed and assessed for a period of no more than six years.

Menu

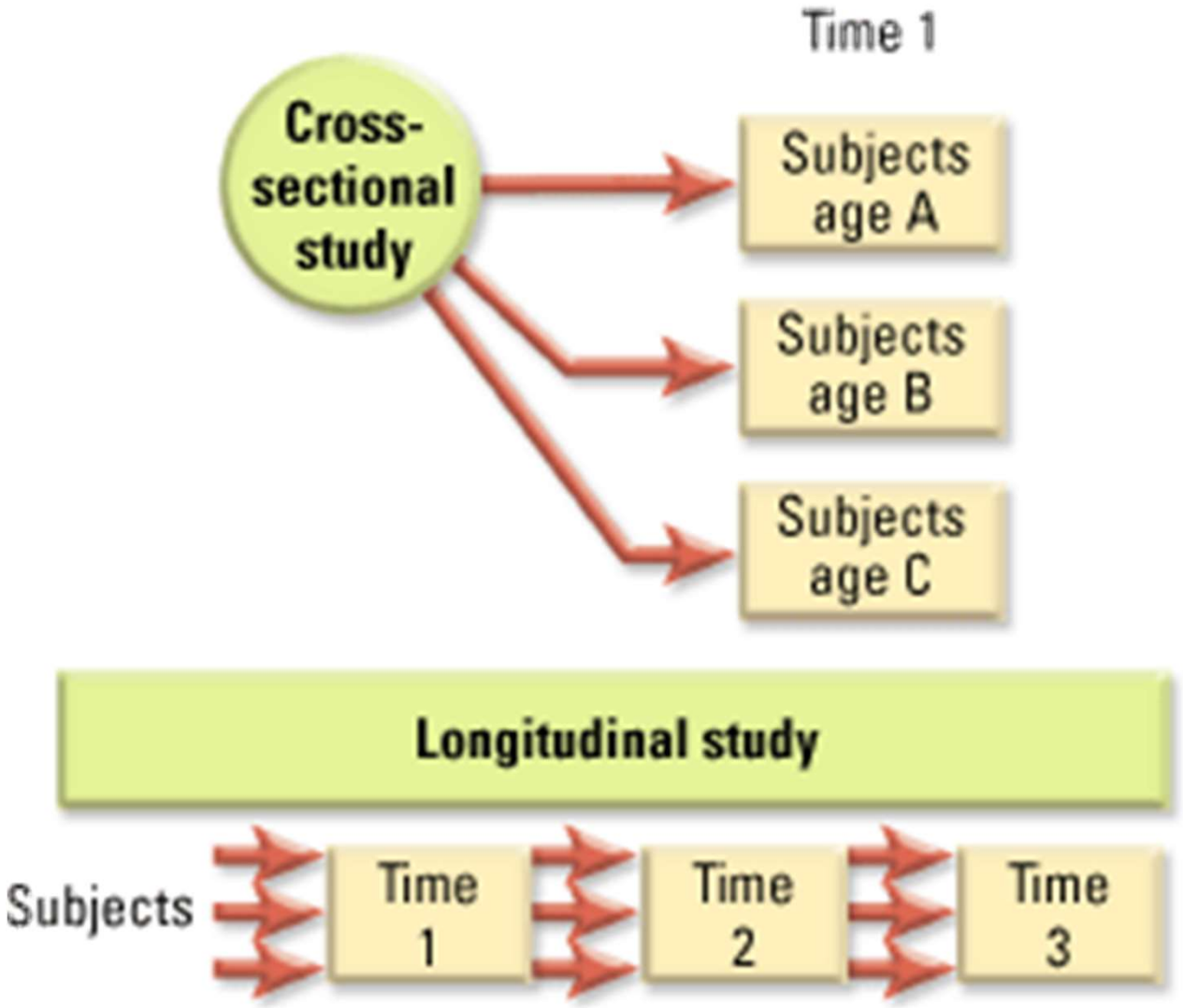
LO 7.1 Special research methods used to study development

TABLE 7.1 A COMPARISON OF TWO DEVELOPMENTAL RESEARCH DESIGNS

Cross-Sectional Design		
Different participants of various ages are compared at one point in time to determine age-related *differences*	**Group One** 20-year-old participants	Research done in 2005
	Group Two 40-year-old participants	
	Group Three 60-year-old participants	
Longitudinal Design		
The same participants are studied at various ages to determine age-related *changes*	**Study One** 20 year old partidpants	Research done in 1965
	Study Two Same participants are now 40 years old	Research done in 1985
	Study Three Same participants are now 60 years old	Research done in 2005

Menu

LO 7.1 Special research methods used to study development

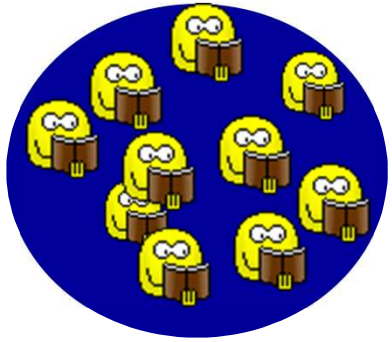


Menu

Longitudinal Design

Tested at 1 year
(Time 1)

Again at 4 years
(Time 2)



Again at 7 years
(Time 3)

Longitudinal Design

Tested at 1 year (Time 1)

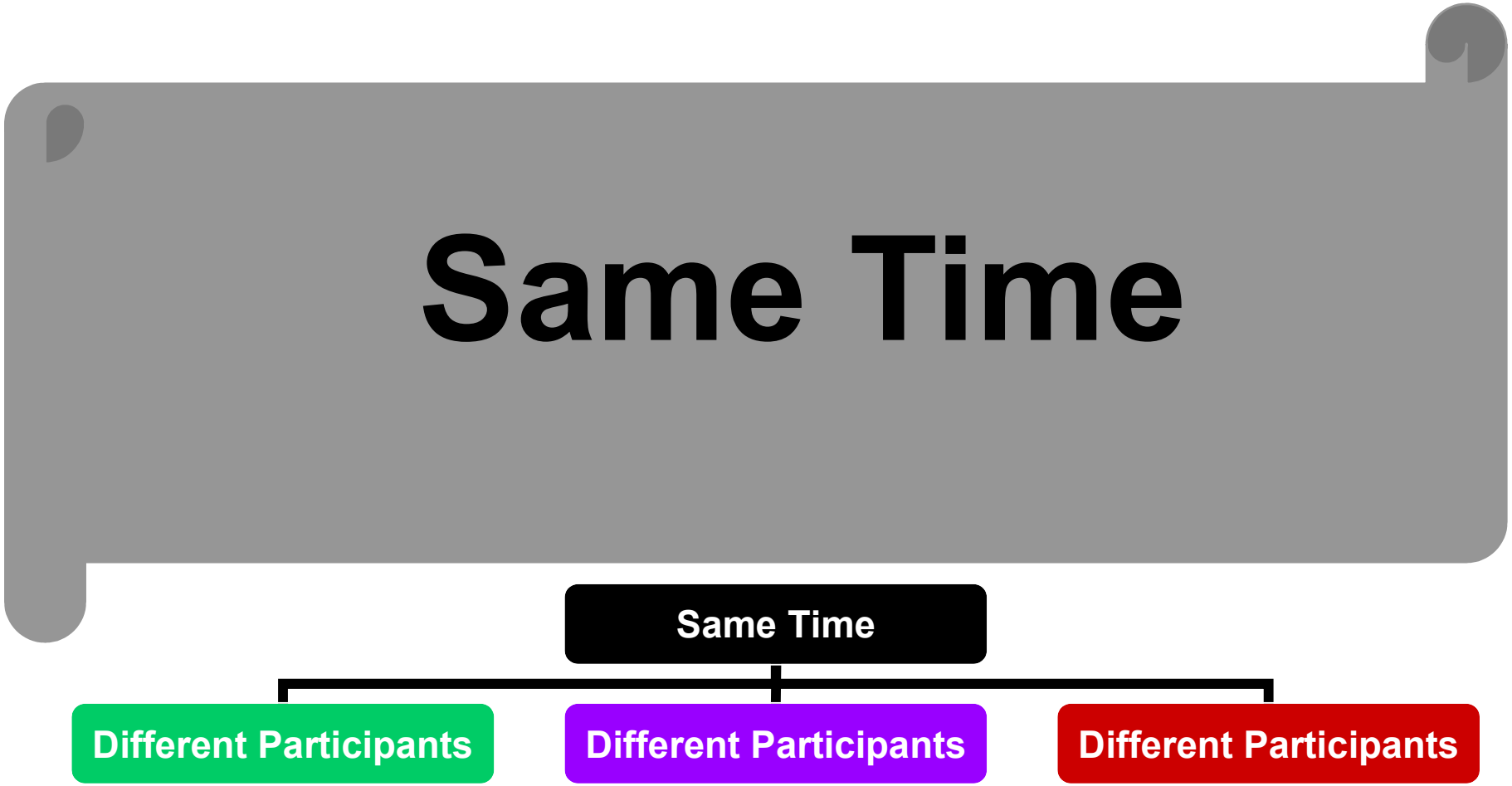
Again at 4 years (Time 2)

Again at 7 years (Time 3)

Same Participants

- **Different Times**
- **Different Times**
- **Different Times**

Cross-Sectional Design



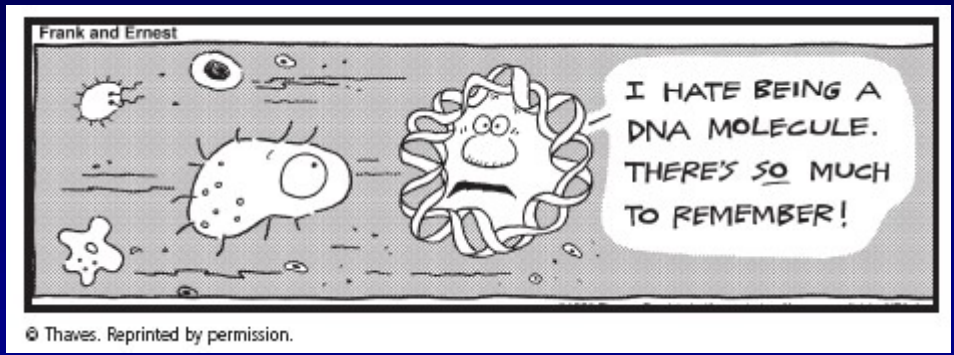
Nature versus Nurture

- Nature - the influence of our inherited characteristics on our personality, physical growth, intellectual growth, and social interactions.
- Nurture - the influence of the environment on personality, physical growth, intellectual growth, and social interactions.
- Behavioral genetics – focuses on nature vs. nurture.

Menu

Genetics and Development

- Genetics - the science of inherited traits.
- DNA (deoxyribonucleic acid) - special molecule that contains the genetic material of the organism.

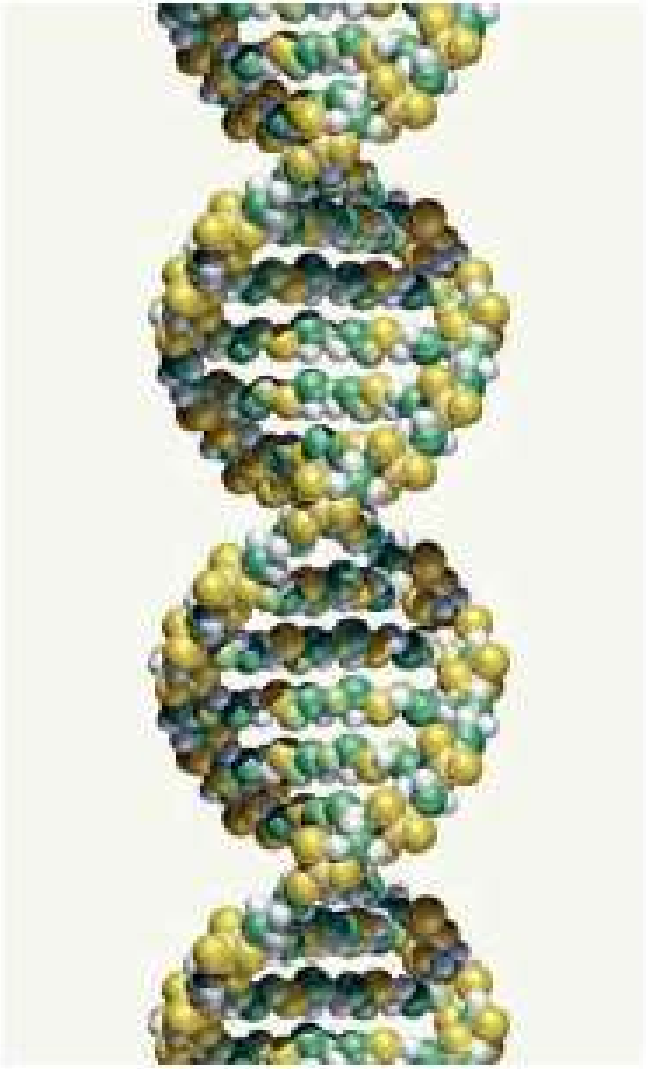


- Gene - section of DNA having the same arrangement of chemical elements.
  - Dominant - referring to a gene that actively controls the expression of a trait.
  - Recessive - referring to a gene that only influences the expression of a trait when paired with an identical gene.

Menu

LO 7.

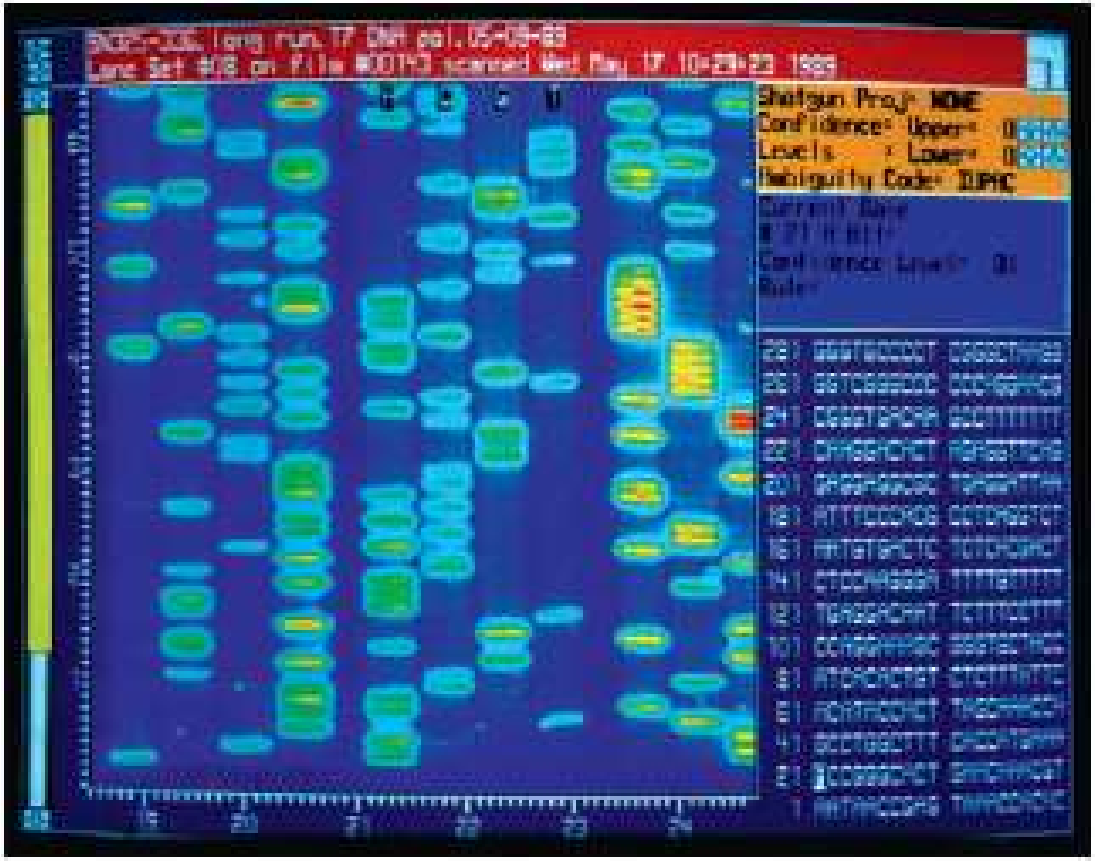
FIGURE 7.1 **DNA Molecule**
In this model of a DNA molecule, the two strands making up the sides of the "twisted ladder" are composed of sugars and phosphates. The "rungs" of the ladder that link the two strands are amines. Amines contain the genetic codes for building the proteins that make up organic life.



Menu

LO 7.3 Chromosomes, genes and DNA

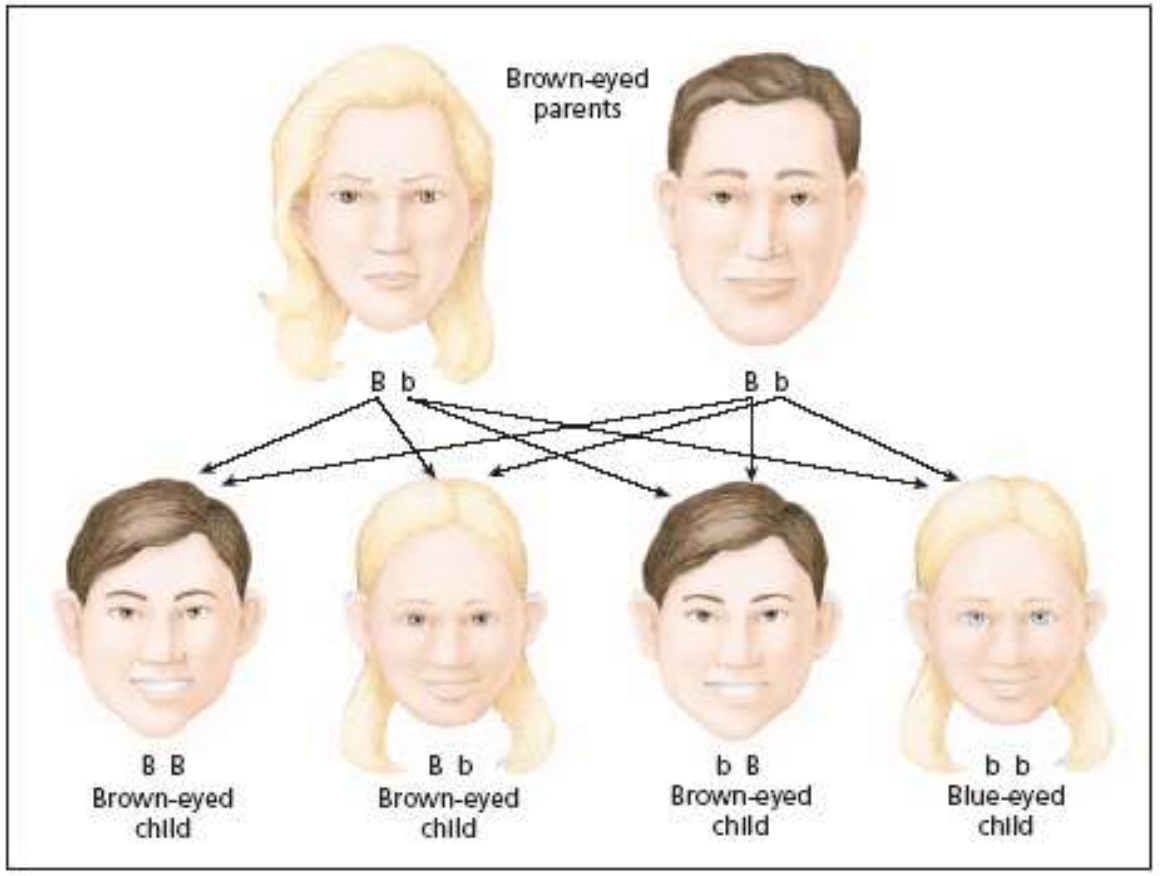
The Human Genome Project was completed in 2003 and identified approximately 20,000 to 25,000 genes in the human genetic material.



Menu

LO 7.3 Chromosomes, genes and DNA

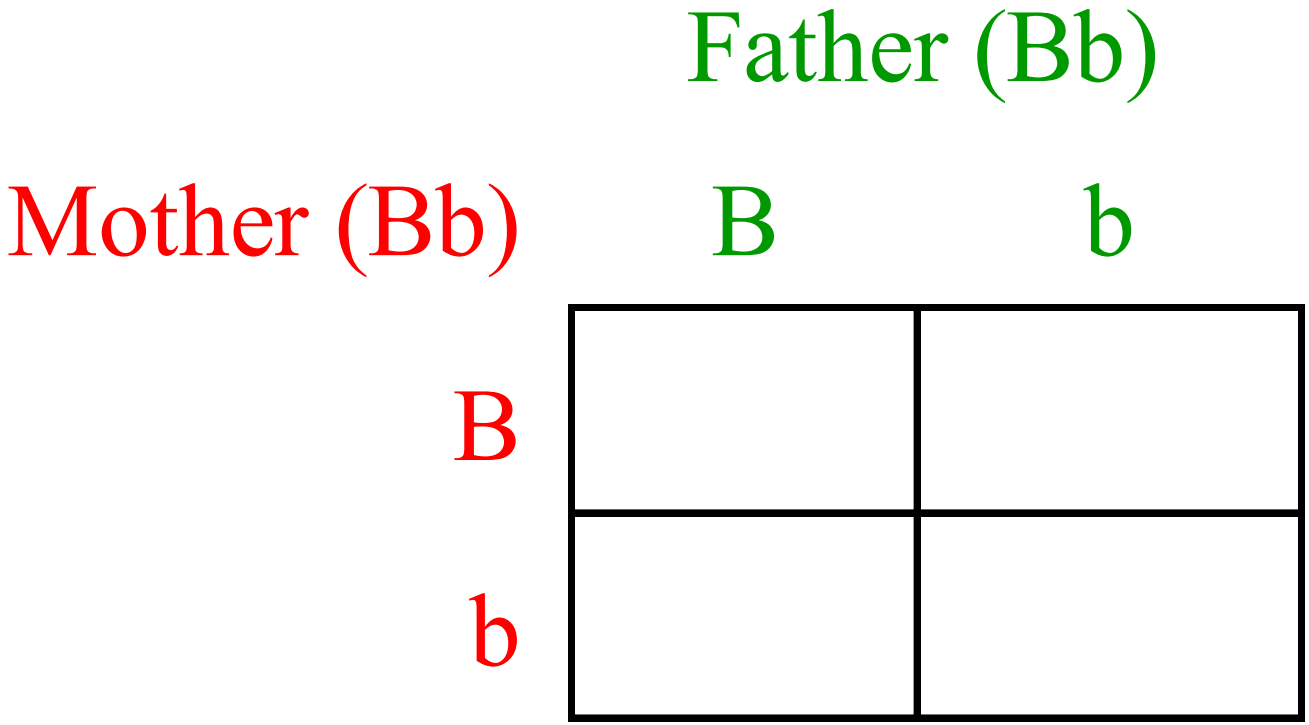
FIGURE 7.2 **Dominant and Recessive Genes and Eye Color** Each of these brown-eyed parents carries one dominant gene for brown eyes (B) and one recessive gene for blue eyes (b). The children represent the possible combinations of the parents' genes. Each parent could pass on the dominant brown eye genes, resulting in a brown-eyed child with no recessive genes (one chance out of four possible combinations). One parent could pass on the dominant gene while the other passes on the recessive gene, resulting in a child with brown eyes who carries the recessive blue eye gene (two chances out of four). Finally, each parent could pass on the recessive blue eye gene, leading to a child with blue eyes who carries two recessive genes for blue eyes (one chance out of four). In other words, each child this couple bears has a 25 percent chance of having blue eyes.



Menu

Mendel Box

B=Brown eyes b=Blue eyes



Menu

Mendel Box

B=Brown eyes b=Blue eyes

Father (Bb)

	B	b
B	B	b
B	B	b

Menu

Mendel Box

B=Brown eyes b=Blue eyes

Mother (Bb)

B	B	B
b	b	b

Menu

Mendel Box

B=Brown eyes b=Blue eyes

Mother (Bb)	Father (Bb) B	Father (Bb) b
B	BB	bB
b	Bb	bb

Menu

75% have brown eyes.
25% have blue eyes.

Mother (Bb)	Father (Bb) B	Father (Bb) b
B	BB	bB
b	Bb	bb

Menu

Genetics and Development

- Chromosome - tightly wound strand of genetic material or DNA.
- Chromosome disorders include Down syndrome, Klinefelter's syndrome, and Turner's syndrome, whereas genetic disorders include PKU, cystic fibrosis, sickle cell anemia, and Tay-Sachs disease.

Menu

Genetics and Development

- Conception - the moment at which a female becomes pregnant.
- Ovum - the female sex cell, or egg.
- Fertilization - the union of the ovum and sperm.

- Zygote - cell resulting from the uniting of the ovum and sperm; divides into many cells, eventually forming the baby.

Menu

Conception and Twins

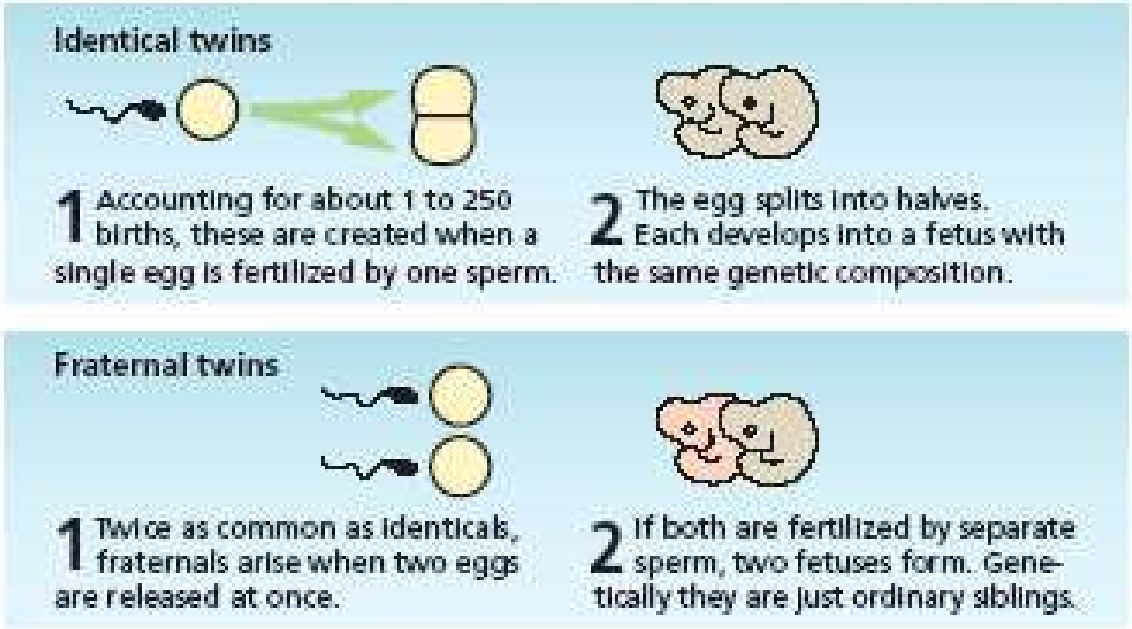
- Monozygotic twins - identical twins formed when one zygote splits into two separate masses of cells, each of which develops into a separate embryo.
- Dizygotic twins - often called fraternal twins, occurring when two eggs each get fertilized by two different sperm, resulting in two zygotes in the uterus at the same time.

Menu

LO 7.4 How twins develop during pregancy

FIGURE 7.3 **Monozygotic and Dizygotic Twins** Because identical twins come from one fertilized egg (zygote), they are called monozygotic. Fraternal twins, who come from two different fertilized eggs, are called dizygotic.

Source: Kantrowitz and Springen (1987), pp. 60–61.


Identical twins
1 Accounting for about 1 to 250 births, these are created when a single egg is fertilized by one sperm.
2 The egg splits into halves. Each develops into a fetus with the same genetic composition.
Fraternal twins
1 Twice as common as identicals, fraternals arise when two eggs are released at once.
2 If both are fertilized by separate sperm, two fetuses form. Genetically they are just ordinary siblings.

Menu

Conjoined Twins

- Conjoined twins
  Abby and Britty Hensel are relatively healthy, well adjusted, and participate fully in many normal activities for young people of their age.

Menu

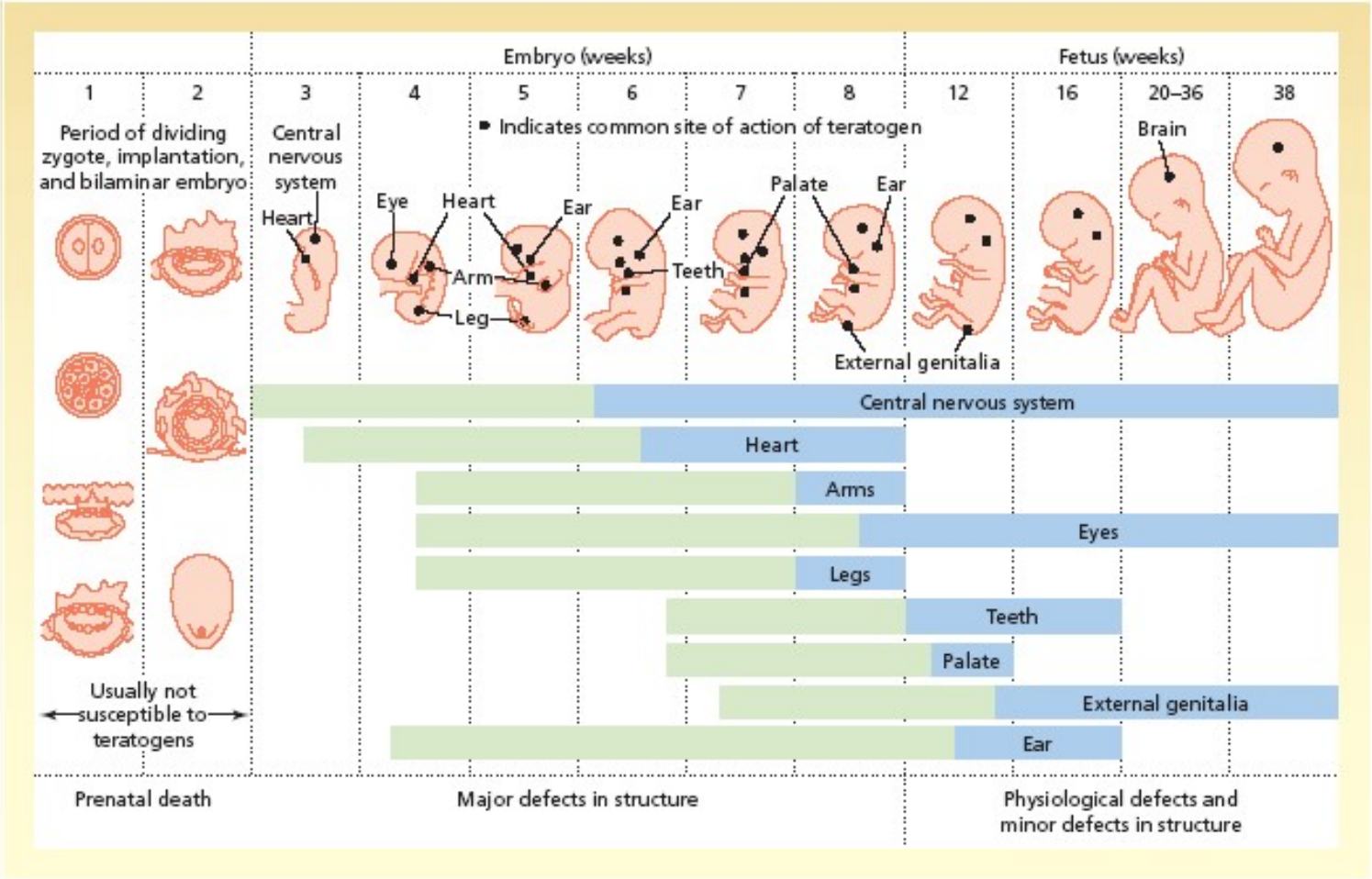
Periods of Pregnancy

- Germinal period - first two weeks after fertilization, during which the zygote moves down to the uterus and begins to implant in the lining embryo name for the developing organism from two weeks to eight weeks after fertilization.
- Embryonic period - the period from two to eight weeks after fertilization, during which the major organs and structures of the organism develop.
  - Critical periods - times during which certain environmental influences can have an impact on the development of the infant.
  - Teratogen - any factor that can cause a birth defect.

Menu

FIGURE 7.4 **Sensitivity to Outside Influences** This chart shows the various time periods during which different organs and bodily structures are most vulnerable to the effects of teratogens. The green areas indicate the possibility of severe structural defects, such as a baby born with no arms, no legs, or a deformed heart. The blue areas indicate more minor structural defects and problems in the way organs and systems may function. Why would the developing organism not be susceptible t first two weeks?

LO 7.6 Germinal, embryonic, and fetal periods of pregnancy



Menu

TABLE 7.2 COMMON TERATOGENS

Teratogenic Agent	Effect on Development
Rubella	Blindness, deafness, heart defects, brain damage
Marijuana	Irritability, nervousness, tremors; infant is easily disturbed, startles
Cocaine	Decreased height, low birth weight, respiratory problems, seizures, learning difficulties; infant is difficult to soothe
Alcohol	Fetal alcohol syndrome (mental retardation, delayed growth, facial malformation), learning difficulties, smaller than normal heads
Nicotine	Miscarriage, low birth weight, stillbirth, short stature, mental retardation, learning disabilities
Mercury	Mental retardation, blindness
Syphilis	Mental retardation, deafness, meningitis
Caffeine	Miscarriage, low birth weight
Radiation	Higher incidence of cancers, physical deformities
High Water Temperatures	Increased chance of neural tube defects

Source: Shepard, T. H. (2001).

Menu

Periods of Pregnancy

- Fetal period - the time from about eight weeks after conception until the birth of the child.
  - Fetus - name for the developing organism from eight weeks after fertilization to the birth of the baby.

Menu

LO 7.6 Germinal, embryonic, and fetal periods of pregnancy

The three periods of pregnancy are the germinal period, lasting about two weeks, the embryonic period, from about two to eight weeks, and the fetal period, which lasts from eight weeks until the end of pregnancy.

Menu

Physical Development in Infancy and Childhood

- Four critical areas of adjustment for the newborn are:
  - Respiration
  - Digestion
  - Circulation
  - Temperature regulation
- Infants are born with reflexes that help the infant survive: sucking, rooting, Moro (startle), grasping, and Babinski.
- The senses, except for vision, are fairly well developed at birth.
- Gross and fine motor skills develop at a fast pace during infancy and early childhood.

Menu

LO 7.7 Physical changes in infancy and childhood

FIGURE 7.5 **Five Infant Reflexes**
Shown here are (a) Grasping (b) Moro–startle (c) Rooting (d) Stepping (e) Sucking. These infant reflexes can be used to check on the health of an infant's nervous system. If a reflex is absent or abnormal, it may indicate brain damage or some other neurological problem.

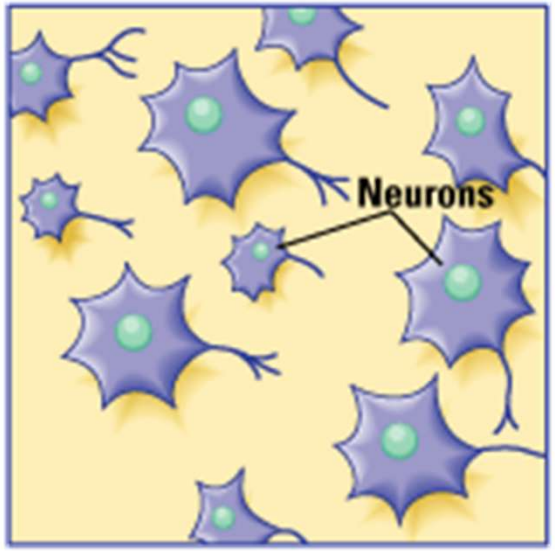
Menu

LO 7.7 Physical changes in infancy and childhood

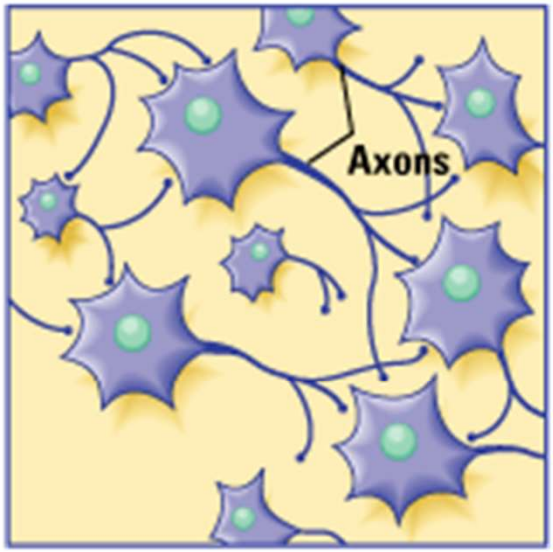
FIGURE 7.6 **Six Motor Milestones** Shown here are (a) Raising head (b) Rolling over (c) Propped up (d) Sitting up (e) Crawling (f) Walking. The motor milestones develop as the infant gains greater voluntary control over the muscles in its body, typically from the top of the body downward. This pattern is seen in the early control of the neck muscles and the much later development of control of the legs and feet.

Menu

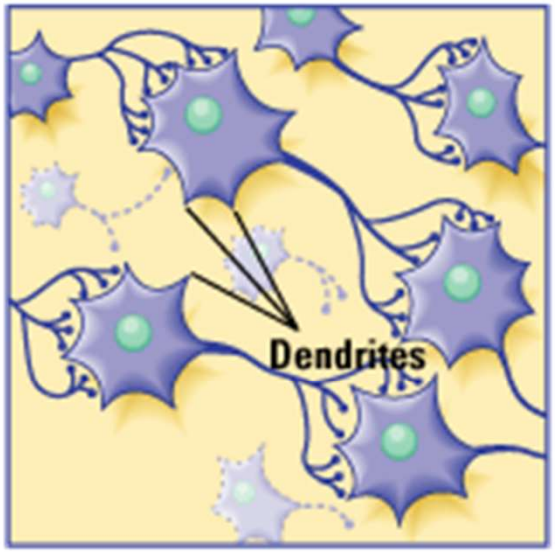
LO 7.7 Physical changes in infancy and childhood



1 At birth, the infant's brain has a complete set of neurons but not very many synaptic connections.



2 During the first year, the axons grow longer, the dendrites increase in number, and a surplus of new connections is formed.



3 Over the next few years, active connections are strengthened, while unused connections atrophy.

Menu

Immunizations

- Immunizations are far less dangerous than the diseases they are designed to prevent and are one of the most effective weapons in the fight against infectious diseases.

Menu

Cognitive Development

- Cognitive development - the development of thinking, problem solving, and memory scheme (plural schemas) a mental concept formed through experiences with objects and events.

Menu

Piaget's Stage Theory

- Sensorimotor stage - Piaget's first stage of cognitive development in which the infant uses its senses and motor abilities to interact with objects in the environment.

  - Object permanence - the knowledge that an object exists even when it is not in sight.

Menu

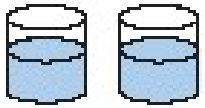
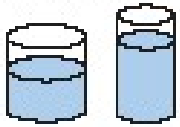
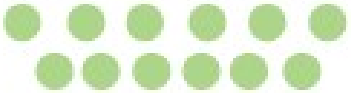
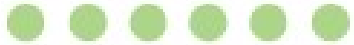
Piaget's Stage Theory

- Preoperational stage - Piaget's second stage of cognitive development in which the preschool child learns to use language as a means of exploring the world.
  - Egocentrism - the inability to see the world through anyone else's eyes.
  - Centration - in Piaget's theory, the tendency of a young child to focus only on one feature of an object while ignoring other relevant features.
  - Conservation - in Piaget's theory, the ability to understand that simply changing the appearance of an object does not change the object's nature.
  - Irreversibility - in Piaget's theory, the inability of the young child to mentally reverse an action.

Menu

LO 7.9 Three ways of looking at cognitive development

FIGURE 7.7 **Conservation Experiment** A typical conservation task consists of pouring equal amounts of water into two glasses of the same size and shape. When the water from one of these glasses is poured into a taller, narrower glass, children who cannot yet conserve tend to focus (centrate) on the height of the water in the second glass, assuming that the second glass now has more water than the first one. In the second example, pennies are laid out in two equal lines. When one line is moved so that the pennies are further apart, the child who cannot yet conserve will centrate on the length of the top line of pennies and assume that there are actually more pennies in that top line.

Type of conservation	Initial presentation	Transformation	Question	Preoperational child's answer
Liquids	Two equal glasses of liquid 	Pour one into a taller, narrower glass. 	Which glass contains more?	The taller one.
Number	Two equal lines of pennies	Increase spacing of pennies in one line. 	Which line has more pennies?	The longer one. 

Menu

Piaget's Stage Theory

- Concrete operations stage - third stage of cognitive development in which the school-age child becomes capable of logical thought processes but is not yet capable of abstract thinking.

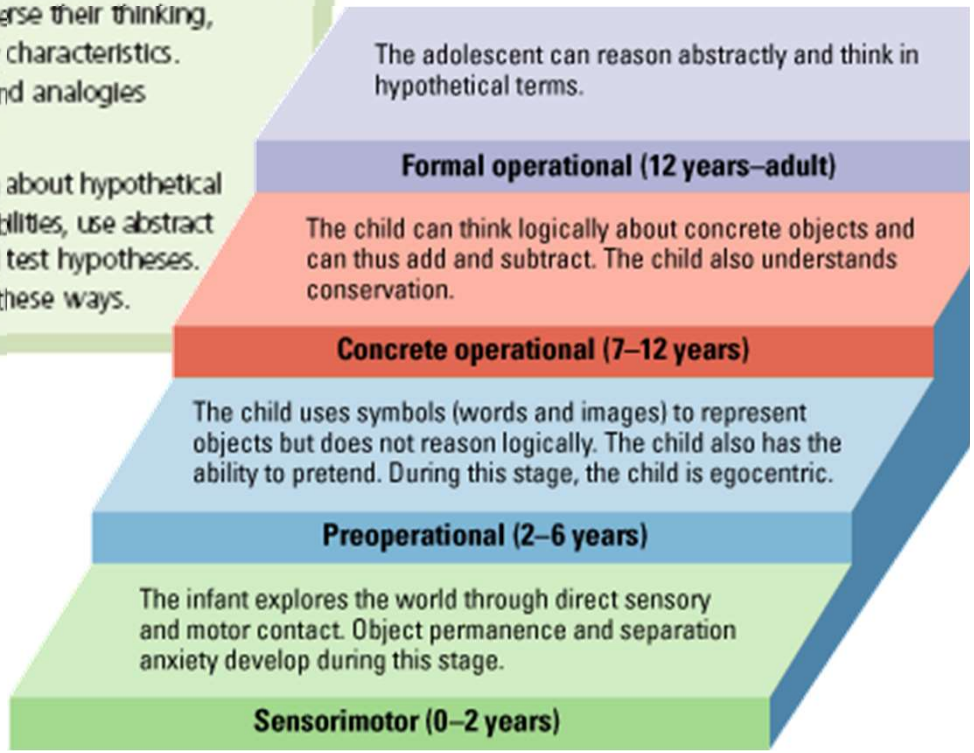
- Formal operations - Piaget's last stage of cognitive development in which the adolescent becomes capable of abstract thinking.

Menu

LO 7.9 Three ways of looking at cognitive development

TABLE 7.3 PIAGET'S STAGES OF COGNITIVE DEVELOPMENT

Stage	Cognitive Development
Sensorimotor Birth to 2 years old	Children explore the world using their senses and ability to move. They develop object permanence and the understanding that concepts and mental images represent objects, people, and events.
Preoperational 2 to 7 years old	Young children can mentally represent and refer to objects and events with words or pictures and they can pretend. However, they can't conserve, logically reason, or simultaneously consider many characteristics of an object.
Concrete Operational 7 to 12 years old	Children at this stage are able to conserve, reverse their thinking, and classify objects in terms of their many characteristics. They can also think logically and understand analogies but only about concrete events.
Formal Operational 12 years old to adulthood	People at this stage can use abstract reasoning about hypothetical events or situations, think about logical possibilities, use abstract analogies, and systematically examine and test hypotheses. Not everyone can eventually reason in all these ways.


The adolescent can reason abstractly and think in hypothetical terms.
Formal operational (12 years–adult)
The child can think logically about concrete objects and can thus add and subtract. The child also understands conservation.
Concrete operational (7–12 years)
The child uses symbols (words and images) to represent objects but does not reason logically. The child also has the ability to pretend. During this stage, the child is egocentric.
Preoperational (2–6 years)
The infant explores the world through direct sensory and motor contact. Object permanence and separation anxiety develop during this stage.
Sensorimotor (0–2 years)

Menu

Vygotsky's Theory

- Scaffolding - process in which a more skilled learner gives help to a less skilled learner, reducing the amount of help as the less skilled learner becomes more capable.
- Zone of proximal development (ZPD) - Vygotsky's concept of the difference between what a child can do alone and what that child can do with the help of a teacher.

Menu

Information Processing Theory

- Metamemory – process by which children improve in their memory capacity as they age, learn to use control strategies to improve memory performance, and gain a better understanding of how their own memories work.

Menu

Stages of Language Development

- Cooing
- Babbling
- One-word speech (holophrases)
- Telegraphic speech
- Language acquisition device - governs the learning of language during infancy and early childhood.

Menu

Temperament

- Temperament - the behavioral characteristics that are fairly well established at birth.
  - Easy - regular, adaptable, and happy
  - Difficult - irregular, nonadaptable, and irritable
  - Slow to warm up - need to adjust gradually to change.

Menu

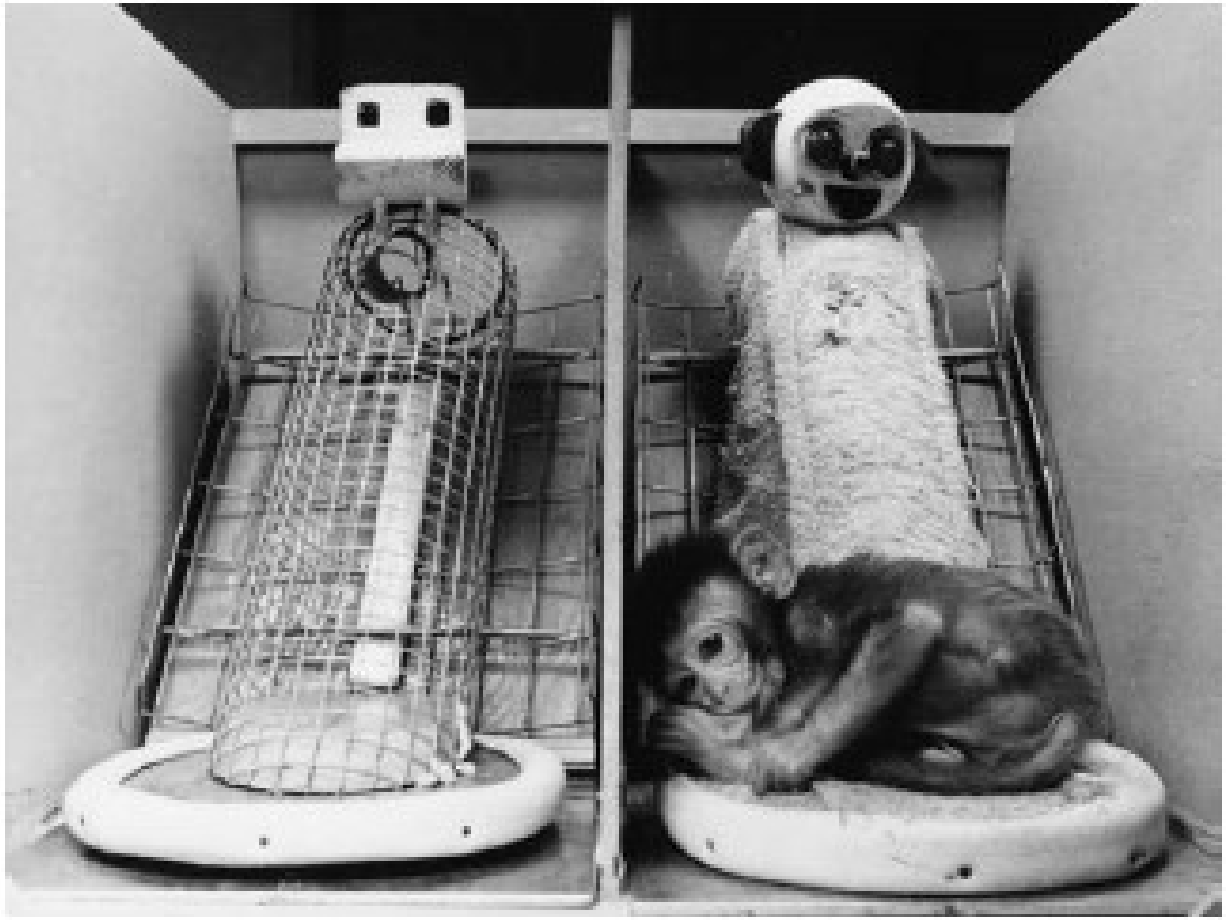
Attachment

- Attachment - the emotional bond between an infant and the primary caregiver.
  - Secure - willing to explore, upset when mother departs but easily soothed upon her return.
  - Avoidant – unattached; explore without "touching base."
  - Ambivalent - insecurely attached; upset when mother leaves and then angry with mother upon her return.
  - Disorganized-disoriented – insecurely attached and sometimes abused or neglected; seemed fearful, dazed, and depressed.

Menu

LO 7.11 How infants and children develop personalities / form relationships

The wire surrogate "mother" provides the food for this infant rhesus monkey. But the infant spends all its time with the soft, cloth-covered surrogate. According to Harlow, this demonstrates the importance of contact comfort in attachment.



Menu

Erikson's First Four Stages

- Trust versus mistrust - first stage of personality development in which the infant's basic sense of trust or mistrust develops as a result of consistent or inconsistent care.
- Autonomy versus shame and doubt - second stage of personality development in which the toddler strives for physical independence.

Menu

Erikson's First Four Stages

- Initiative versus guilt - third stage of personality development in which the preschool-aged child strives for emotional and psychological independence and attemps to satisfy curiosity about the world.
- Industry versus inferiority - fourth stage of personality development in which the adolescent strives for a sense of competence and self-esteem.

Menu

LO 7.12 Erikson's first four stages of psychosocial development

TABLE 7.4 ERIKSON'S PSYCHOSOCIAL STAGES OF CHILDHOOD

Stage	Developmental Crisis	Successful Dealing with Crisis	Unsuccessful Dealing with Crisis
1. Infant Birth to 1 year old	**Trust versus Mistrust** Babies learn to trust or mistrust others based on whether or not their needs—such as food and comfort—are met.	If babies' needs are met, they learn to trust people and expect life to be pleasant.	If babies' needs are not met, they learn not to trust.
2. Toddler 1 to 3 years old	**Autonomy versus Shame and Doubt** Toddlers realize that they can direct their own behavior.	If toddlers are successful in directing their own behavior, they learn to be independent.	If toddlers' attempts at being independent are blocked, they learn self-doubt and shame for being unsuccessful.
3. Preschool Age 3 to 5 years old	**Initiative versus Guilt** Preschoolers are challenged to control their own behavior, such as controlling their exuberance when they are in a restaurant.	If preschoolers succeed in taking responsibility, they feel capable and develop initiative.	If preschoolers fail in taking responsibility, they feel irresponsible, anxious, and guilty.
4. Elementary School Age 5 to 12 years old	**Industry versus Inferiority** When children succeed in learning new skills and obtaining new knowledge, they develop a sense of industry, a feeling of competence arising from their work and effort.	When children succeed at learning new skills, they develop a sense of industry, a feeling of competence and self-esteem arising from their work and effort.	If children fail to develop new abilities, they feel incompetent, inadequate, and inferior.

Menu

Gender Role Development

- Gender- the behavior associated with being male or female.
- Gender identity - perception of one's gender and the behavior that is associated with that gender.

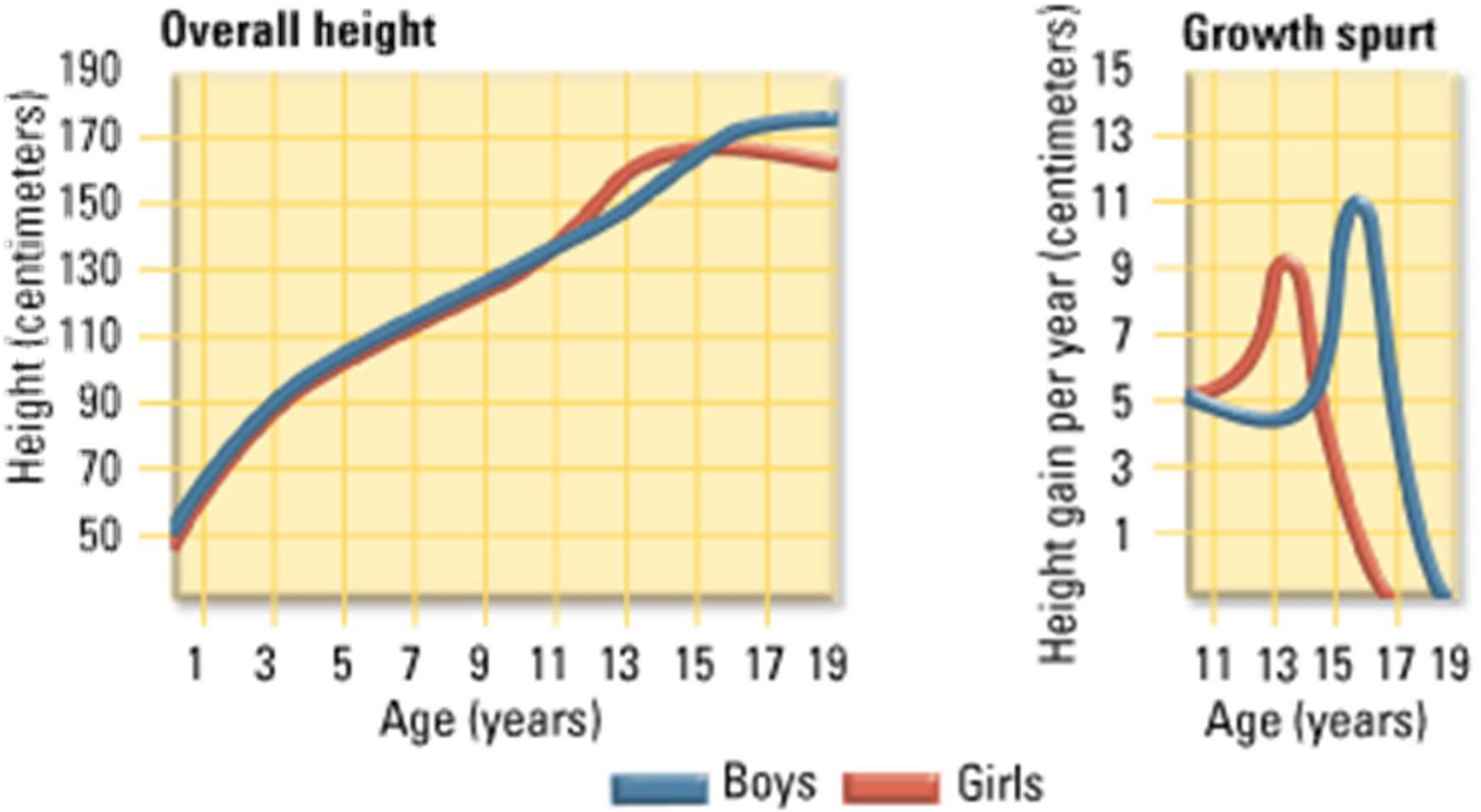
Menu

Puberty and Adolescence

- Adolescence - the period of life from about age 13 to the early twenties, during which a young person is no longer physically a child but is not yet an independent, self-supporting adult.
- Puberty - the physical changes that occur in the body as sexual development reaches its peak.
  - Period of about four years.

Menu

LO 7.13 Changes in puberty



Menu

Egocentric Thinking

- Personal fable - type of thought common to adolescents in which young people believe themselves to be unique and protected from harm.
- Imaginary audience - type of thought common to adolescents in which young people believe that other people are just as concerned about the adolescent's thoughts and characteristics as they themselves are.

Menu

Development of Morality

- Preconventional morality - first level of Kohlberg's stages of moral development in which the child's behavior is governed by the consequences of the behavior.
- Conventional morality - second level of Kohlberg's stages of moral development in which the child's behavior is governed by conforming to the society's norms of behavior.
- Postconventional morality - third level of Kohlberg's stages of moral development in which the person's behavior is governed by moral principles that have been decided on by the individual and which may be in disagreement with accepted social norms.

Menu

LO 7.14 How adolescents develop formal operation and moral thinking

FIGURE 7.8 **Example of a Moral Dilemma**
Source: Kohlberg, 1969, p. 379.

Example of a Moral Dilemma

A woman in Europe was dying from a rare disease. Her only hope was a drug that a local druggist had discovered. The druggist was charging ten times more than it cost him to make it. Heinz, the husband of the dying woman, had desperately tried to borrow money to buy the drug, but he could borrow only half of the amount he needed. He went to the druggist, told him that his wife was dying, and asked to let him pay the druggist later or to sell the drug at a lower cost. The druggist refused, saying that he had discovered the drug and he was going to make money from it. Later, Heinz broke into the druggist's store to steal the drug for his wife. Should Heinz have done that? Why?

Menu

LO 7.14 How adolescents develop formal operation and moral thinking

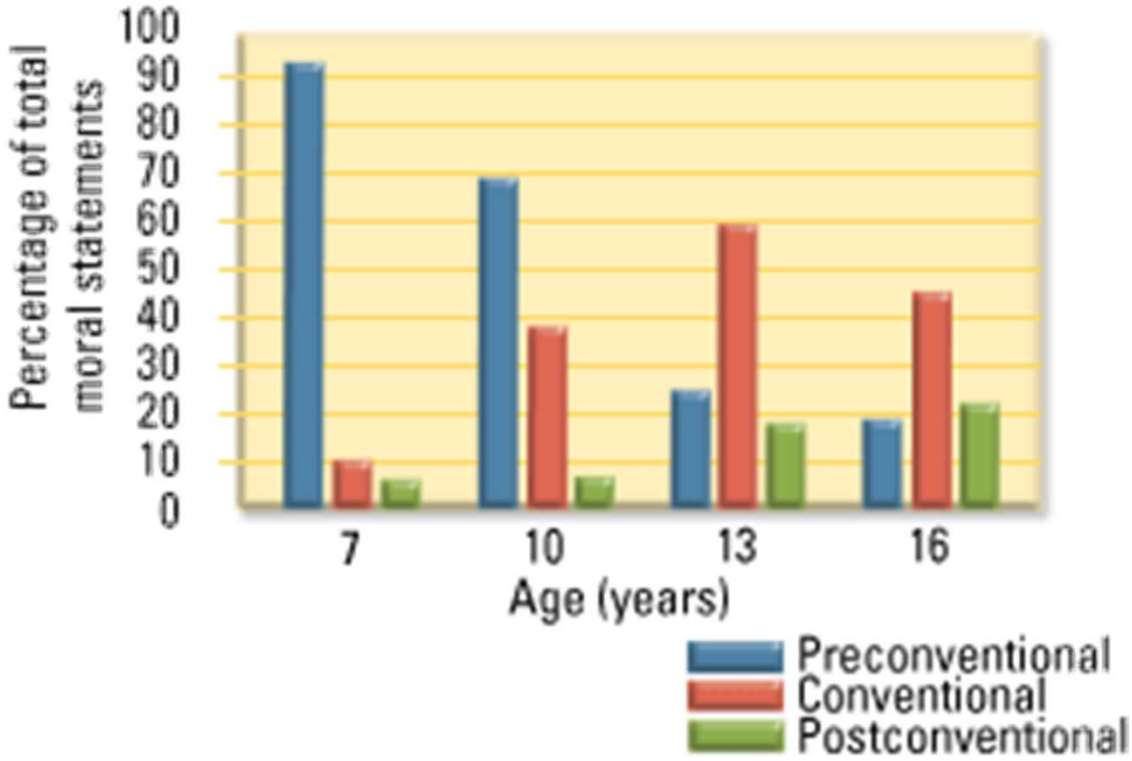
TABLE 7.5 KOHLBERG'S THREE LEVELS OF MORALITY

Level of Morality	How Rules Are Understood	Example
Preconventional* morality (typically very young children)	The consequences determine morality; behavior that is rewarded is right, that which is punished is wrong.	A child who steals a toy from another child and does not get caught does not see that action as wrong.
Conventional morality (older children, adolescents, and most adults.)	Conformity to social norms is right; nonconformity is wrong.	A child criticizes his or her parent for speeding because speeding is against the stated laws.
Postconventional morality (about 20 percent of the adult population)	Moral principles determined by the person are used to determine right and wrong and may disagree with societal norms.	A reporter who wrote a controversial story goes to jail rather than reveal the source's identity.

* The term *conventional* refers to general standards or norms of behavior for a particular society, which will differ from one social group or culture to another.

Menu

LO 7.14 How adolescents develop formal operation and moral thinking



Menu

Erikson's Fifth Stage

- Identity versus role confusion - fifth stage of personality development in which the adolescent must find a consistent sense of self.

Menu

Physical Changes and Aging

- Adulthood begins in the early twenties and ends with death in old age.
  - Divided into young adulthood, middle adulthood, and late adulthood.
- Women experience a physical decline in the reproductive system called the climacteric, ending at about age 50 with menopause - the cessation of ovulation and menstrual cycles and the end of a woman's reproductive capability.
- Andropause - gradual changes in the sexual hormones and reproductive system of males.
- Increase in health problems, decrease in reaction time, and stability in intelligence and memory.

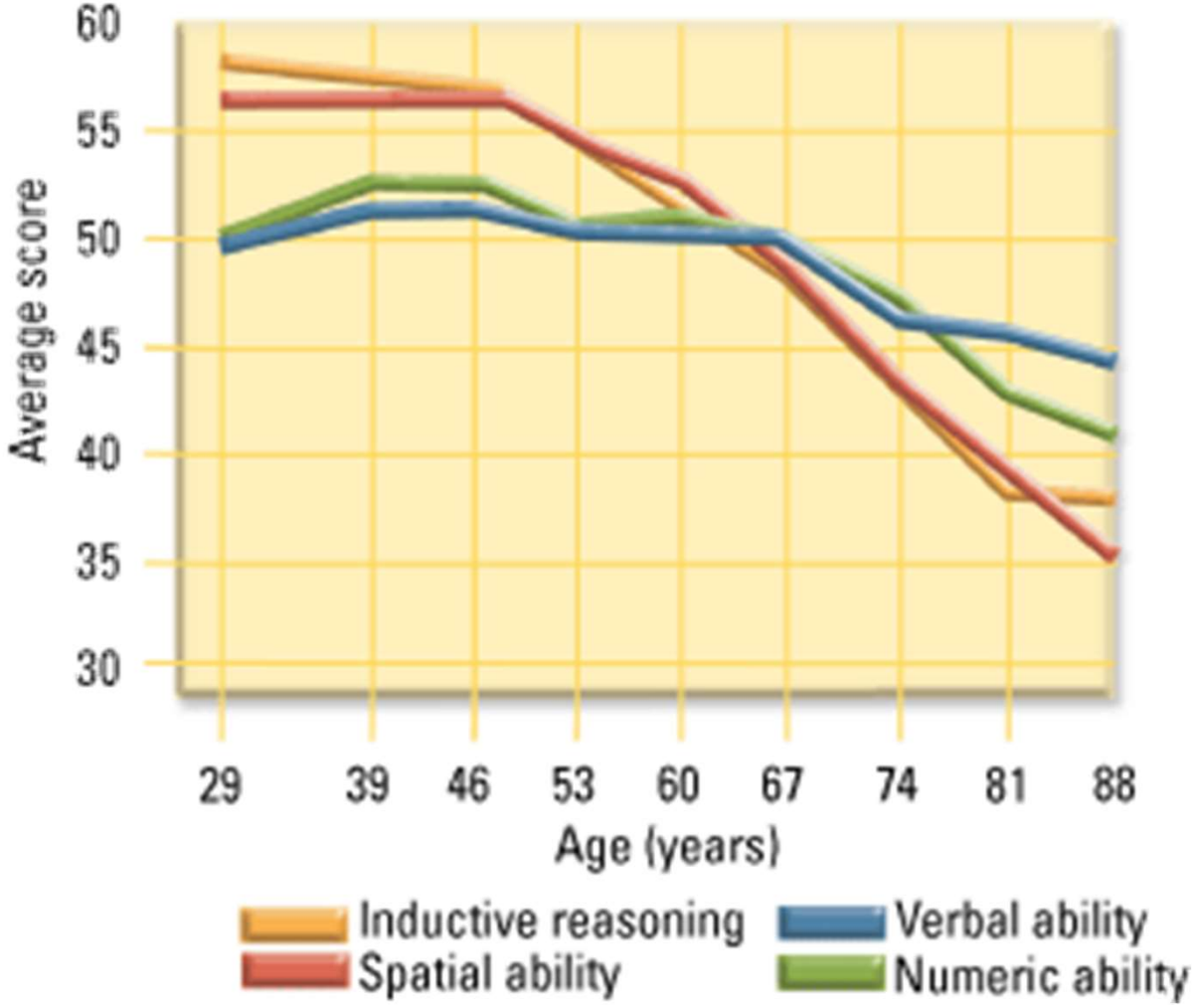
Menu

LO 7.16 Physical and cognitive changes during adulthood and aging

Jeanne Calment of Arles, France, was the oldest living human ever recorded. Biologists see 120 as the upper limit of the human life span. In February 1997, six months before her death, Calment celebrated her 122nd birthday.

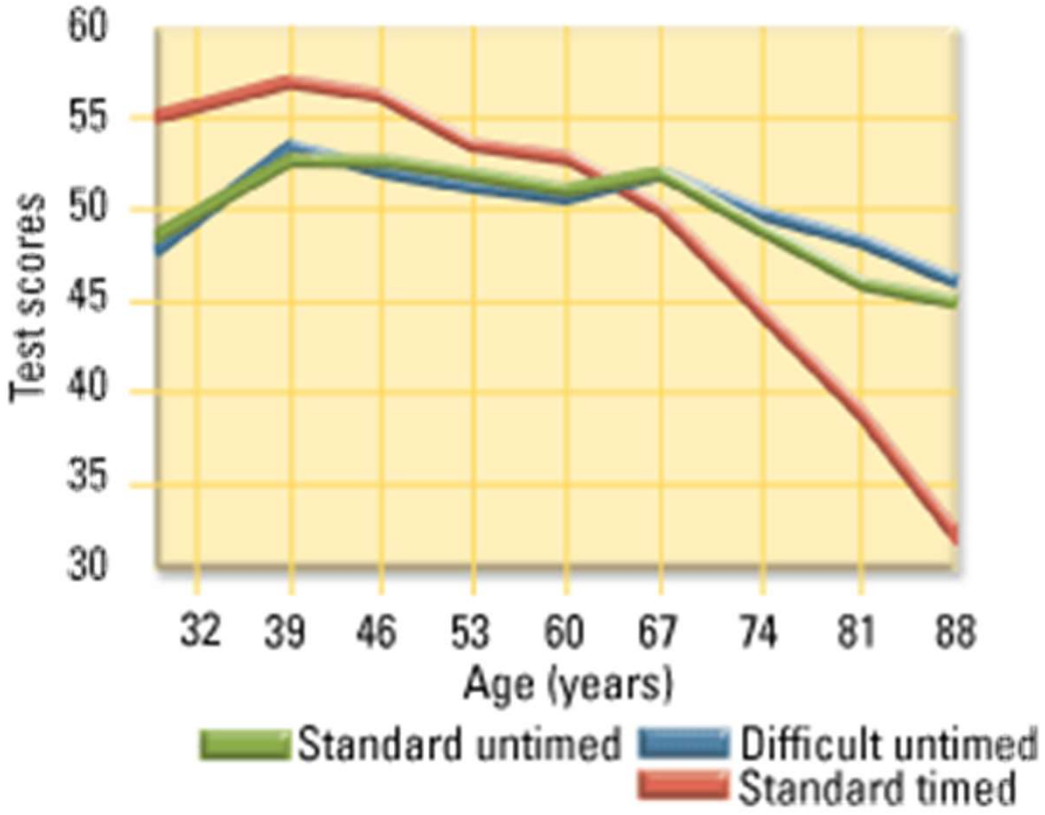
Menu

LO 7.16 Physical and cognitive changes during adulthood and aging



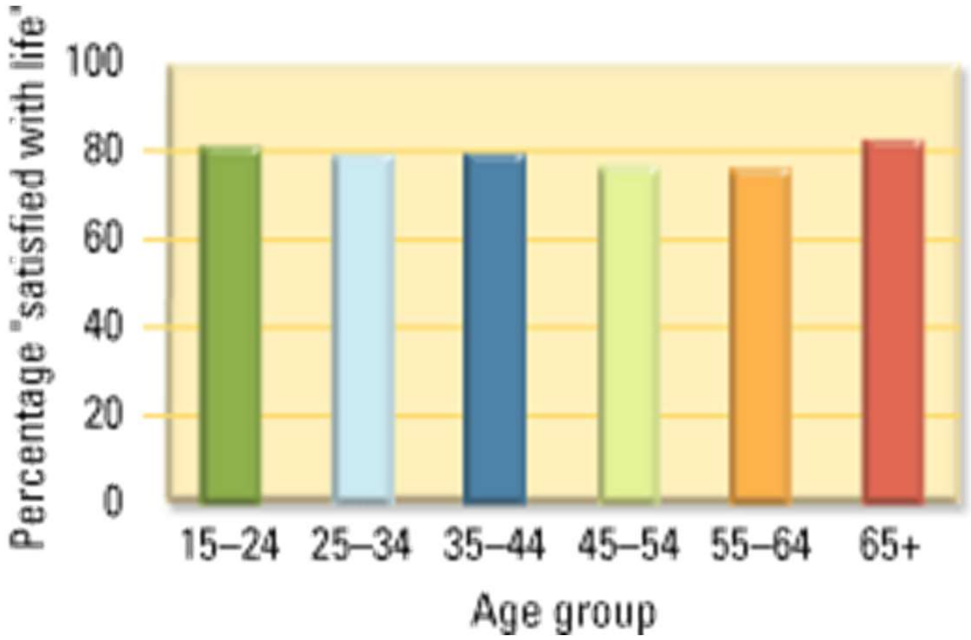
Menu

LO 7.16 Physical and cognitive changes during adulthood and aging



Menu

LO 7.16 Physical and cognitive changes during adulthood and aging



Menu

Erikson's Last Three Stages

- Intimacy - an emotional and psychological closeness that is based on the ability to trust, share, and care, while still maintaining a sense of self.
- Generativity - providing guidance to one's children or the next generation, or contributing to the well-being of the next generation through career or volunteer work.
- Integrity - sense of wholeness that comes from having lived a full life and the ability to let go of regrets; the final completion of the ego.

Menu

LO 7.17 Work, relationships, parenting, aging, and death

TABLE 7.6 ERIKSON'S PSYCHOSOCIAL ADOLESCENT AND ADULT STAGES

Age	State	Developmental Crisis	Successful Dealing with Crisis	Unsuccessful Dealing with Crisis
Adolescence	5	**Identity versus Role Confusion** Adolescents are faced with deciding who or what they want to be in terms of occupation, beliefs, attitudes, and behavior patterns.	Adolescents who succeed in defining who they are and find a role for themselves develop a strong sense of identity.	Adolescents who fail to define their identity become confused and withdraw, or want to inconspicuously blend in with the crowd.
Early adulthood	6	**Intimacy versus Isolation** The task facing those in early adulthood is to be able to share who they are with another person in a close, committed relationship.	People who succeed in this task will have intimate relationships.	Adults who fail at this task will be isolated from other people and may suffer from loneliness.
Middle adulthood	7	**Generativity versus Stagnation** The challenge is to be creative, productive, and nurturant of the next generation.	Adults who succeed in this challenge will be creative, productive, and nurturant, thereby benefiting themselves, their family, community, country, and future generations.	Adults who fail will be passive, and self-centered, feel that they have done nothing for the next generation, and feel that the world is no better off for their being alive.
Late adulthood	8	**Ego Integrity versus Despair** The issue is whether a person will reach wisdom, spiritual tranquility, a sense of wholeness, and acceptance of his or her life.	Elderly people who succeed in addressing this issue will enjoy life and not fear death.	Elderly people who fail will feel that their life is empty and will fear death.

Source: Erikson, 1950/1963, 1968.

Menu

Theories of Aging

- Activity theory - theory of adjustment to aging that assumes older people are happier if they remain active in some way, such as volunteering or developing a hobby.

- Cellular clock theory - based on the idea that cells only have so many times that they can reproduce; once that limit is reached, damaged cells begin to accumulate.

Menu

Theories of Aging

- Wear-and-tear theory - as time goes by, repeated use and abuse of the body's tissues cause it to be unable to repair all the damage.
- Free radical theory - oxygen molecules with an unstable electron move around the cell, damaging cell structures as they go.

Menu

Stages of Death and Dying

1. Denial
2. Anger
3. Bargaining
4. Depression
5. Acceptance

Menu

Adult ADHD

- Many children with ADHD grow up to be adults with ADHD, affecting their work, relationships, and emotional well-being.
- ADHD in adults can be treated with medication and/or therapy.

Menu